

**Innovation Lab <CS299>**

**Report**

*Gesture to Speech*

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CS299

**GESTURE TO SPEECH**

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# Abstract

Our project is aimed to make communication between deaf/mute and general people much easier. Most of the normal people are not able to understand the sign language used by deaf/mute people which makes it tough for deaf/mute people to interact with the world. This project will solve this problem cost effective and in user friendly way. The gesture used by deaf/mute people is generally fixed for certain actions like greeting someone or apologizing. Our project will study these gestures and implement it with the help of sensors fixed to a glove. We will then collect the data from these sensors and map it to the actions which it represents. This will be then shown to an LCD display. We will also add a speaker so that people can understand the gesture easily.

**Aim/Objective-**

To convert the gesture used by deaf/mute people into sound and text so that people who do not understand sign language can interact with deaf/mute people.

**Current Status-**

For now, if someone cannot understand sign language, they need to have someone who can understand it and is able to tell what the deaf/mute person is conveying. However it is not always possible to have someone with deaf/mute person to translate what they are trying to convey.

By the means of technology, we can use computer vision in 3D model by using powerful camera to recognize the patterns. While this method requires high computational power and need of carrying the camera everywhere with the user, this is still a possibility.

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### Novelty-

Converting gesture to normal text is generally hard to implement with cameras and motion detector due to high cost and low accuracy of these things. That method is also very impractical due to need of carrying heavy cameras with the user. It also takes a lot of processing power to detect motion in 3d space.

What out project does best is that it is very portable, so user can take it with them wherever they want without much load. It is also very cost effective with estimate cost of only ~₹2000. It is also very easy to code the gestures in our project as we are using Arduino, which has become worlds’ standard in making projects requiring repetitive actions and low processing power. We have also attached a speaker to this device which makes it a lot easier for someone to understand if they are not reading the display output directly.

**Components Used-**

* Arduino Uno
* Flex Sensors
* Accelerometer
* APR33A3 based board
* 16x2 LCD Display
* Speaker
* Resistors
* Potentiometer
* Gloves
* Jumper Wires
* 9v Battery

**Detailed Development**  
  
We finally succeeded in converting the gestures to sound and text output in our project. We attached different sensors to a glove and made the user wear it so we can collect the data.   
  
A hand gesture involve certain parameters by which deaf and dumb people communicate. We carefully studied these gestures and parameters involved, such as position of hand, bending of fingers.  
  
For collecting the data from the hand, we used flex sensors to find the bend of the finger. We used three flex sensors in total for improved accuracy in decrypting the gestures.   
  
We have also attached an accelerometer to the glove which tells us the position of hand and helps us to differentiate between different gestures which involves similar finger bends.  
  
After taking the input from different flex sensors and accelerometer, we sent it to the Arduino Uno, the microcontroller we are using for this project. There, we firstly noted down the data which involved certain gestures. After that, we mapped those data to some reasonable figures and uploaded the codes to our microcontroller.  
  
Once the data from the gestures were found, we moved on to add audio feedback in our project. For this purpose, we used APR33A3 based 8 channel Voice Recorder and Audio Playback Board. We recorded the audio for all the gestures for which we collected the data. After this we mapped each of the recorded audio feedback to their respective gestures and made it play whenever the corresponding gesture was detected.  
  
Then we added 16x2 LCD display module to our micro-controller for the text based visual output. We added the message corresponding to each of the gestures. Now whenever any gesture was detected, the LCD module will show the corresponding message or stay at rest otherwise.  
  
We have also used different resistors and potentiometer for proper functioning of all the components involved.

**Plan-**

* **15 January -23 January**
* Project Finalized
* Detailed study done on project and related topics
* **24 January - 8 February**
* Different ideas related to solve the problem explored
* Components required for the project finalised
* **8 February - 17 February**
* Bought Arduino Uno and basic items like resistor and capacitor
* Installed Arduino IDE and learnt how to use it
* Done some basic experiments with Arduino
* Acquired flex sensor
* Initial experiments done with flex sensor
* **27 February -10 march**
* Integration of flex sensors with gloves
* Testing of integrated gloves with flex sensor will be done
* **11 March - 18 March**
* Initial experiment of accelerometer will be done
* Integration with current framework of accelerometer will be done
* Data related to gestures will be collected
* **19 March - 27 March**
* Initial Gesture Codes will be uploaded to Arduino
* LCD will be attached for display
* Speaker will be attached and sound uploaded
* **27 March -3 March**
* Calibration module will be added
* Testing with current code will be done
* Bugs will be fixed
* **3 March - 8 March**
* Some more gesture will be added
* Final testing will be done

**Source Code**

*GItHub Link-* <https://github.com/ivary43/ASL-project> (master branch)